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Perceptions of Oral Health Access among Foreign-born College Students

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PERCEPTIONS OF ORAL HEALTH ACCESS AMONG FOREIGN-BORN COLLEGE STUDENTS

by

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ABSTRACT

Oral health plays an integral role in our general health, wellbeing, and quality of life. Practicing evidence-based oral hygiene behaviors prevent oral diseases and improve systemic health. The burden of preventable oral diseases persists worldwide and weighs particularly heavy on specific population groups. While many studies have explored oral health among those of advanced age, children, and minority groups, there are a very few exploring the oral health care needs of postsecondary students, specifically those born outside of the United States (U.S.). Recognizing this gap in the literature, this study sought to gain a better understanding of oral health access among non-US born postsecondary students with a goal of identifying factors affecting their oral health behaviors. To achieve the objectives of this explorative study, a cross-sectional study design was implemented. A 30-question survey was provided to individuals born outside the U.S. and currently enrolled in postsecondary educational institutions. Descriptive statistics was presented, and a quantitative analysis was performed. The study results suggest that foreign-born postsecondary students may perceive oral health care in the U.S as inaccessible due to economic barriers such as costs and lack of insurance. Moreover, it was found that this population is less likely to visit a dentist because they cannot find a "convenient time" or because they believed their "mouth is healthy". Factors associated with perceived improvements in oral hygiene behaviors included enrollment in postsecondary education and the number of years they've resided in the U.S. Conversely, factors associated with a decline in perceived oral hygiene behaviors included school-induced stress and acculturative stress. It was also found that on-campus dental clinics were less frequently utilized than off-campus dental clinics, with many preferring to receive oral health care outside of the U.S. Citizenship status was also found to be a factor influencing student's oral health seeking behaviors.

DEDICATION

To my parents, who immigrated to the U.S. with eyes full of hopes and dreams for their children. Thank you for bestowing within me the value of knowledge and hard work. I would not be where I am today without the unwavering love and support you both have provided me every day.

To my sisters- my best friends- for being my light in the dark, for motivating me and believing in me when I couldn't believe in myself.
I'm beyond blessed to have you two in my life.

To all my friends, who have supported me throughout this journey
I'm better with you on my team.

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INTRODUCTION

Oral health plays an integral role to our general health and wellbeing (WHO, 2011). The oral cavity serves as the primary gateway to the rest of our body and performs essential functions such as initiating digestion, verbal communication, and self-expression. Moreover, it is an important indicator of the presence of chronic conditions such as diabetes and Alzheimer's disease (Mayo Clinic, 2019). Poor oral health can lead to dental cavities, periodontal disease, tooth loss, oral cancer, and other systemic diseases. Cavities and gum diseases are among the most prevalent diseases across the globe, despite their highly preventable nature (WHO, 2010). Risk factors for these diseases are attributable to a complex web of social, economic, environmental, cultural, and behavioral factors. Vulnerable populations are particularly at risk of acquiring these diseases as they often lack access to adequate oral healthcare services (Fdi, 2020).

A significant number of the U.S. population is foreign-born. The U.S. Census Bureau defines the term "foreign-born" as to “anyone who is not a U.S. citizen at birth, including those who become U.S. citizens through naturalization” (U.S. Census Bureau, 2020). According to a 2018 American Community Survey, the foreign-born population of the U.S. was at an all-time high of 44.7 million people, accounting for 13.7% of the total U.S. population (Jeanne Batalova, 2020). A 2017 U.S. Census determined the number of foreign-born students enrolled in higher education to be more than two million students across the nation when accounting for both males and females (U.S. Census Bureau, 2020). Despite the steady influx of diverse populations and immigrants enrolling in U.S. universities, they remain a vulnerable population at-risk for many adverse health outcomes (Derose et al., 2007).

Existing literature indicates that immigrants and minority population groups are "whole populations at risk on the verge of oral health deterioration” (Vered, et. al 2000). Those crossing

national and cultural perimeters experience a variety of barriers to achieve oral health needs and overall wellbeing. Much of these barriers are a product of varying disease patterns, health care measures, and health behavior that differ from their host countries (Vered, et. al 2000). The prevalence of oral diseases varies according to socioeconomic determinants, accessibility to and utilization of dental services, oral health literacy, and oral hygiene behaviors. The country of origin and length of stay in the U.S. or acculturation also play a key role in determining oral health status in foreign-born populations (Crespo, 2019).

The synergistic relationship between oral and systemic health augments the importance of access and utilization of dental services, particularly in high-risk populations. Maintaining quality oral health prevents diseases beyond the mouth and improves our overall health, self-esteem, and quality of life. While there's been research that has explored oral health in immigrant children and older adults, there is a gap in the literature pertaining to the oral health care needs among college students born overseas. Like immigrants, foreign-born students experience a variety of challenges to maintaining adequate oral health. Precarious finances, language barriers, academic difficulties, culture-shock, lack of dental coverage and familiarity of health care systems, all contribute to undesirable oral health outcomes. Therefore, the aim of this study is to investigate the self-perceptions of oral health factors among foreign-born university students enrolled in U.S. postsecondary institutions. Insight into the social and behavioral determinants in self-perceived oral health will help identify any barriers to oral health access as we gain a better understanding of how to improve oral health among this vulnerable population.

LITERATURE REVIEW

"Oral Health in America: A Report of the Surgeon General" was released in the year 2000 which for the first time emphasized the importance of oral health as an integral part of general health for all Americans. Major findings of the report indicated that while there have been significant advances in oral health care, profound disparities still remain in population groups such as the poor, elderly, medically compromised and racial and ethnic minorities. The report stated that oral diseases are a "silent epidemic" that disproportionately affect vulnerable populations. The burden of oral diseases negatively affects overall health and diminishes quality of life by restricting activities in school, home and at work. The report also provided a framework for action where it outlined the need to change perceptions on oral health, in a way that individuals more readily accept oral health as a component of general health. The report urged for known barriers be removed to make oral health services more accessible to people. Additionally, the need for further research to eliminate disparities in disadvantaged populations, building health infrastructure to meet oral health needs and forming public-private partnerships to improve oral health for all were discussed in the report. (U.S. Department of Health and Human Services, 2020). To lessen the burden of oral diseases, Healthy People 2020 included a major goal to control and prevent oral and craniofacial diseases as well as improving access to dental care and preventative services (HP, 2020).

According to a CDC research study, 17.5% of children between 5-19 years and 27.4% of adults between 20-44 years were found to have tooth decay. While oral health knowledge, attitude and behaviors all contribute to one's oral health status, socioeconomic and demographic factors are also an important contributor (Dewald EdD et al., 2016). Research focused on college students have shown that students who suffer from food insecurity are also less likely to have adequate oral

hygiene products, such as toothbrushes, toothpastes, and dental floss (Dewald EdD et al., 2016). Acquiring and maintaining dental insurance as well as finding a dentist in the area that accepts a specific dental plan may also impede access to oral health. As college students born overseas, they may have additional barriers to meeting oral health needs due to stressors from school or new environment affecting their oral health behaviors. Making time to visit a dentist around school and work can also be challenging, especially if the student has no reliable transportation. To improve oral health and minimize barriers it is important for us to understand the perceptions of oral health in a target population. A research study by Bettinghaus found that health behavior can be influenced by utilizing a model known as the knowledge-attitude-behavior model which works by a continuous process of acquiring knowledge on the topic, generating belief and ultimately forming new behavior" (Bettinghaus, 1986). Since level of knowledge and attitude have a correlation on behavior formation, increasing oral health literacy can significantly improve oral health in individuals.

Oral Microbiome and Disease

Tooth decay, and gum disease are widely prevalent in all age groups and etiologically tied to regular plaque buildup on teeth surfaces. Plaque is a sticky, colorless biofilm that forms when bacteria, saliva, and other food particles combine in our mouth (Rosan et al., 2000). The oral cavity's microbiome is extremely diverse - containing over 700 species of bacteria that are site and subject-specific (Aas et al., 2005). According to the Human Microbiome Project, the oral cavity contains about 26% of all bacterial species in the human body. While some bacteria are healthy and essential to maintaining oral health, others cause oral diseases. (Frias-Lopez et al., 2020). The plethora of bacteria that adhere to the oral cavity produces acids when it comes in contact with

sugars which causes the tooth's enamel to lose minerals and form cavities. As tooth decay advances, it infects the dental pulp making the tooth extremely sensitive, causing a lot of pain. If cavities are left untreated, the infection will progress forming an abscess, facial swelling, and fever. Accumulation of plaque along the gum line also cause gingivitis (inflammation of the gums), which make gums tender, sensitive, and prone to bleeding. Untreated gingivitis can lead to periodontal disease and tooth loss. Plaque formation not only result in dental problems but also have implications in systemic diseases such as bacterial endocarditis, aspiration pneumonia, low preterm birth, etc. (Aas et al., 2005). Regular oral hygiene practices control plaque formation and decrease the prevalence of tooth decay and periodontal disease while improving overall health and wellbeing.

General Recommendations for a Healthy Mouth

Tooth Brushing and Flossing

To maintain a healthy mouth and smile, the American Dental Association recommends brushing two times a day for at least two minutes with a soft-bristled brush at a 45-degree angle and fluoride toothpaste. Regular brushing removes plaque that coats the teeth and is most effective when brushing time is increased from one to four minutes. (Attin et al., 2005). In addition to brushing, performing an interdental cleaning such as flossing is also recommended daily (ADA, 2020). If oral hygiene practices are suspended, localized gingivitis develop in as little as 4-11 days, while generalized gingivitis takes about 2-3 weeks. However, gingival health dramatically improves when proper brushing and flossing are resumed indicating that plaque buildup does have a negative effect on oral health (Lang et al., 1973)

The Role of Diet

Diet also play a significant role in oral health. While a balanced diet has strong correlations to a healthy mouth, nutritional imbalances influence malformations and the onset of oral diseases. For example, a shortage of vitamins and minerals influence dental organogenesis, and the development of the skull and face (Scardina et al., 2012).

Dietary Calcium, Phosphorus and Vitamin D are essential for tooth formation as well as maintaining good oral health in both children and adults. Calcium strengthens jaw bones and enamel with the help of phosphorus and vitamin D. Tooth remineralization, which is a natural reparative process, depends primarily on salivary levels of calcium salts and fluoride to strengthen tooth structure and prevent tooth decay (Abou Neel et al., 2016).

There is considerable evidence in the literature that a linear relationship exists between sugar consumption and cavities. According to WHO, the amount of sugar and the frequency of consumption are both risk factors for the development of cavities. A systemic review on the relationship of sugar and dental cavities have found that a free sugar intake of <5% energy resulted in lesser cavity formation when compared with >5% but ≤10% of energy (Moynihan, 2016). A series of experiments that completely defy modern day medical ethics were conducted at the Vipeholm hospital in Sweden between 1945 and 1953. The study focus was to investigate the role of sugars in tooth decay. Intellectually disabled patients at the hospital were fed large amounts of sugars specially formulated to stick to teeth to identify any relationship between sugar consumption and cavity formation. Despite their inhumane experimental procedure, scientifically speaking, the research was quite a success. The extremely sweet and sticky diet have shown to have a direct correlation to cavity formation (König et al., 1995). Although the incidence of cavity formation decreased when foods rich in sugar were no longer consumed, an important finding of

the research was that an increased frequency of sugar intake between meals was associated to an increase in cavity formation as opposed to large amounts of sugar consumed during meals (König et al., 1995). Although social and behavioral factors as well as individual susceptibility determine cavity formation, decreasing amount of sugar consumption and frequency of "snacking" is recommended to control the development of tooth decay (Scardina et al., 2012).

Fluoride- Friend or Foe?

Fluoride is perhaps one of the most studied micronutrients when it comes to oral health promotion. Although the benefits of fluoride are often debated, it has been well documented over 50 years to play a pivotal role in preventing cavities by promoting remineralization of the tooth's enamel. Dr. Frederick McKay was the first dentist who researched the effects of fluoride on teeth surfaces upon observing some brown stains on the permanent teeth of some of his patients. His study results showed that the staining of the teeth or dental fluorosis was caused by the presence of fluoride in drinking water in certain parts of Colorado. Epidemiological studies were then conducted by Trendley Dean in the early 1930s investigating the geographical distribution of dental fluorosis and found that while fluoride is the causative agent in dental fluorosis, it has an inverse relation to cavity formation (Clarkson et al., 2000). The primary mode of action of fluoride on teeth is post-eruptive (topical) such that it promotes remineralization of enamel while inhibiting demineralization during tooth decay (Clarkson et al., 2000). This understanding of fluoride's action on cavity prevention has diversified methods of its delivery. Thereafter, fluoride has been incorporated in drinking water, toothpastes, rinses, fluoride varnish, etc. Research studies have demonstrated the optimum fluoride exposure to be 1.0 to 1.5 mg per day for maximum cavity prevention and minimum dental fluorosis. The optimal fluoride level in drinking water is in the

range 0.7 to 1.2 parts per million (Clarkson et al., 2000). Fluoride is a key component in toothpastes added as a preventative measure. Controlled clinical trials investigating the effectiveness of fluoride toothpastes have shown to reduce cavities by 30 % (Clarkson et al., 2000). While fluoride doesn't entirely eliminate cavities, it does help prevent them, and reduce decay progression. Existing literature on water fluoridation have also found fluoride prevents cavities by more than 25% in both children and adults, despite its widespread availability from other sources (ADA, 2018). A coordinated approach to fluoride exposure is key to the control and prevention of cavity formation.

Risk behaviors affecting Oral Health

Lifestyle considerations such as tobacco smoking, alcohol consumption, and oral piercings are high risk behaviors that have implications in poor oral health. The use of tobacco products and excessive alcohol consumption have been found to be risk behaviors for developing oral cancer (Dewald EdD et al., 2016). Thirty thousand new cases of oral cancer develop each year, causing about eight thousand deaths, with the mortality rate being twice as much in black males compared to white males. The human papillomavirus (HPV), which is transmitted through oral or genital contact is a growing concern for oral cancer. (Dewald EdD et al., 2016). There are about 79 million cases of cancer related to HPV, 14 million new infections develop each year. The increased likelihood of college age students to engage in tobacco smoking, excessive alcohol consumption and oral sex put them in high risk for oral cancers (Dewald EdD et al., 2016). Oral piercings are also typically seen in young adults with the most common site being the tongue. Oral piercing is an invasive procedure with high risk of bleeding, swelling, infection, and lingual nerve damage.

Chipped or damaged teeth as well as tongue splitting are also some complications that arise as a result of intraoral or perioral piercings that outweigh any potential benefit (ADA, 2020).

Oral Health Care in Foreign-born Students

Socioeconomic and Sociodemographic factors

Historically, cavities and periodontal disease have been one of the most concerning global burdens on oral health and are strongly associated with sociodemographic and socioeconomic factors (WHO, 2010). While cavities are more prevalent in children, affecting about 60–90% of them, periodontal disease is more prevalent among older adults and tend to increase with age (WHO, 2010). According to a recent CDC report, periodontal diseases affect 47.2% of adults aged 30 and older and increase to 70.1% in adults aged 65 years and older (CDC, 2013). This condition is also more common in men than women, those with persistent poverty and lower education levels (CDC, 2013). Although children and older adults are more at risk for oral diseases, the prevalence of cavities among adults is very high globally as it affects 100% of the population in most countries (WHO, 2010). The burden of preventable diseases, however, particularly weighs on poor and disadvantaged population groups. Dental care becomes particularly expensive as disease conditions worsen. The high costs associated with some dental procedures make it difficult for low-income immigrants to meet their oral health needs. According to a recent study on "Prevalence of oral health problems in U.S. adults" by Kim and Jung Ki, African Americans, and people with a migration background are more likely to experience oral health problems at a younger age in the United States with the disparities being more pronounced at older ages (Kim, et al., 2012). Therefore, early interventions in racial/ethnic and socioeconomic minorities are key in preventing oral diseases.

Role of Country of Origin and Acculturation

Oral health is also influenced by the country of origin of the foreign-born individual. Dietary practices, cultural beliefs, exposure to preventative measures, oral health practices, and care-seeking behaviors are all factors that have important implications for an individual's oral health status. Religious or cultural beliefs affect attitudes towards oral health and oral hygiene behaviors. A study on oral health of Chinese immigrants conducted by MacEntee and Michael, indicated that immigrants from some countries prefer home remedies to cure dental discomfort over visiting a general dentist. Attitudes towards western medicine are culture specific and determines oral health status and service utilization (MacEntee, et al., 2012). Preventative methods such as water fluoridation and sealant programs in schools are effective measures in preventing cavities. According to HealthyPeople 2020, water fluoridation prevents tooth decay by 18% to 40% while dental sealants prevent tooth decay by 80% in a population (HP, 2020). Some developing countries lack adequate fluoridation in their water supply and have no school-based preventive programs. This results in poorer oral health and increase the risk for developing oral diseases in the population.

Acculturation is defined as the lifestyle and behavioral adaptations in an individual due to cultural shifts. A review of studies regarding acculturation indicate that increasing acculturation result in improved oral health outcomes (Crespo, 2019). This is directly linked to the length of stay in the U.S. The longer a foreign-born individual stay in the U.S., the more accustomed they get with the culture. Through time and experience, their attitudes toward oral health change and they put more emphasis on keeping the mouth healthy and utilizing services as they become more familiar with the health care system (Crespo, 2019).

Oral health literacy and Oral hygiene behaviors

Foreign-born population, typically migrating from developing countries, often lack oral health literacy and are overall less aware of disease prevention measures. The American Dental Association defines oral health literacy as "the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate oral health decisions" (ADA). Improving oral health literacy, improves an individual's knowledge and attitude towards oral health and helps them better comply with good oral health behaviors. Practicing oral hygiene habits such as fluoride brushing twice daily, flossing once per day and cleaning the mouth after meals are crucial to prevent oral diseases in all age groups (Rothen et al., 2014). Low levels of oral health literacy in foreign-born population limit their ability to understand the importance of oral health, and practice good hygiene behaviors. It also creates obstacles to recognize the risk for oral diseases as well as in accessing and utilizing needed care. Oral health literacy in populations can be improved through effective communication of health information, confirming comprehension of information, making health care systems easy to navigate and implementing educational programs (Committee on Oral Health Access to Services (US), 2011).

Inadequate oral health literacy also leads to engagement in risk behaviors such as smoking or excessive sugar intake. Frequent sugar consumption is a major cause of cavities throughout all populations and tend to be more prevalent in those with inadequate fluoride exposure (Hu et al., 2018). Smoking, on the other hand, is a major risk factor for periodontal disease and oral cancer and the risk is further increased when used in combination with alcohol intake. Half of all the cases of periodontitis among adults and 90% of cancers in the oral cavity is caused by smoking. The incidences of oral cancer are particularly high in Asia and is directly associated with tobacco smoking (WHO, 2010).

Access to and Utilization of Oral Health Services

In addition to all the barriers to oral health care discussed above, access to oral health in foreign-born population can also be limited by the lack of dental coverage, culturally unresponsive care and transportation issues (Crespo, 2019). Health insurance is a significant barrier to health care access among immigrants. It promotes financial access and provides a regular source of care. According to National Research Council, individuals who lacked dental insurance were two-thirds less likely to have a dental visit compared to people with a private insurance (National Research Council, 2012). Compared to the 92% of U.S. born counterparts, only 66% of foreign-born children had "a regular source of care" and delay health seeking behaviors by more than a year (Guendelman, 2001). Although health insurance is a requirement for international students in most universities, they may not include dental coverage. Foreign-born students who haven't utilized the U.S. healthcare system and complex insurance plans, often experienced difficulties in understanding what services were available to utilize (Tang et al., 2018). Culturally responsive care is a healthcare system that acknowledges the patient's home culture as an important factor that affects how an individual interact with healthcare systems (Crespo, 2019).

In efforts to make oral health more accessible to diverse populations, a deeper understanding of cultural beliefs, attitudes, behaviors and past dental experiences also need to be considered. Minimizing language barriers and increasing diversity in workforce improves cultural competence and expands access to care for racial and ethnic minority patients. Culturally responsive care increases patient choice, satisfaction and improves communication, while reinforcing the professional and ethical role of caring for underserved populations programs (Committee on Oral Health Access to Services (US), 2011).

Language barriers play a critical role in oral health access and utilization. Foreign-born population who are not proficient in speaking English encounter significant challenges in accessing and utilizing dental services. Difficulties in communication have been repeatedly found in various studies to be a key barrier in access to oral health care (Crespo, 2019). According to 2017 Pew Research, immigrants from Mexico had lowest rates of English proficiency when compared to individuals immigrating from Europe, Canada, Sub-Saharan Africa or the Middle East (Radford, 2019). The lack of language proficiency hinders the understanding of availability of services and deprives the foreign-born from meeting their dental care needs.

While lower rates of utilization are mostly associated with insufficient language and communication skills, lack of transportation and anxiety-triggered dental visits also result in underutilization of services (Crespo, 2019). Barriers to oral health care access in foreign-born population overlap a number of determinants. While some barriers are more pronounced than others, foreign-born university enrolled students ought to face unique challenges to maintain good oral health and overall wellbeing.

RESEARCH OBJECTIVES

The primary purpose of this research is to explore perceptions of oral health access among non-U.S. born college students with the goal of gaining a better understanding of the factors that drive this population's oral health behaviors.

RESEARCH AIMS

- Aim 1: Explore perceptions of oral health access among foreign-born college students
- Aim 2: Identify factors that have an effect on this population's oral hygiene behaviors
- Aim 3: Investigate potential barriers to access and utilization of oral health services

HYPOTHESIS

- Hypothesis 1: Foreign-born postsecondary students are less likely to access oral health care in the U.S. due to the perception that services are unaffordable.
- Hypothesis 2: Oral hygiene behaviors among foreign-born postsecondary students are more likely to improve upon arriving to the U.S and decrease in college.
- Hypothesis 3: Potential barriers to oral health utilization are cost, lack of dental insurance, language, cultural incompetence and inadequate oral health literacy.

METHODOLOGY

The target population for this study were students who were born outside the U.S. and enrolled in postsecondary educational institute, including students who are immigrants, refugees, international, foreign exchange, and students who are undocumented or have an unclear immigration status. The exclusion criteria for this study were students who are under the age of 18 and/or were born in the U.S.

This study utilized a cross-sectional study design. The survey was developed using previously established questionnaires and subsequently modified according to the study interest. The "Oral Health Questionnaire for Adults" from the World Health Organization (WHO) and the "Oral Health and Wellbeing in the United States" questionnaire from the American Dental Association (ADA) were utilized to construct the survey questions for this study. The survey consisted of 30 questions and included items that were indicators for sociodemographic (age, gender) and socioeconomic status (employment status, education, family income). Additional questions relating to migration history (year of migration to U.S., region of origin), oral hygiene behaviors and oral health knowledge and attitudes were included using a five-point Likert scale. This survey was administered through Qualtrics and provided to students enrolled in a postsecondary educational institute via email, social media platforms, and Webcourses. The survey was voluntary and did not collect any personal identifiable information. The collected data was analyzed using SPSS program and descriptive statistics were presented. Excel spreadsheets were utilized to create pie charts and bar graphs to graphically present the data and draw conclusions on potential relationships.

RESULTS

Demographics of Survey Participants

The sample was well distributed between males and females, with 47% of the participants identifying as male and 43% female. The remaining 10% of the participants did not respond this aforementioned question. The age range of survey respondents was 18-26, with the exception of one respondent being 58 years old. The mean age of the sample population was 23.6. More than half of the student population were undergraduates (17 out of 30) and one-third (10 out of 30) were graduate students. The student status for the remaining one-fifth of the study population was unknown.

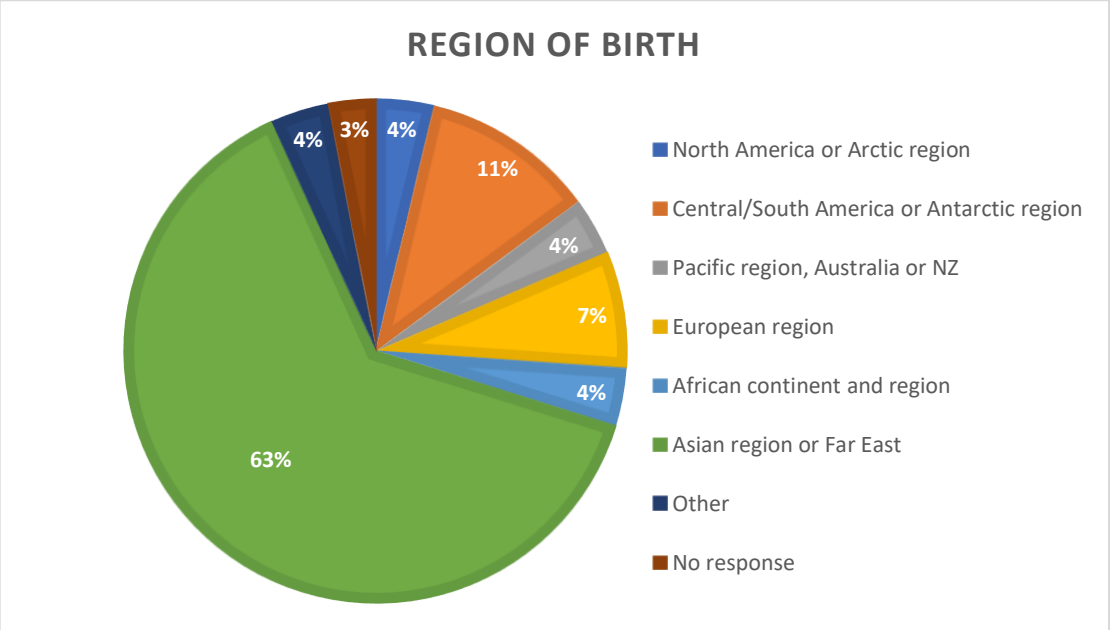

Figure 1: Region where students were born

The majority of the participants in this study were Asian (53%), followed by 17% Hispanic or Latinx, 7% White or European, and 3% Black or African American. The remaining 20% of the participants identified their ethnicity as either "other" or did not respond to the question. As shown

in Figure 1, 63% of the respondents were born in Asia or Far East centric countries. About 11% of the student population was born in Central or South American countries, 7 % in Europe or Scandinavian countries, 4% North America or Artic region, 4 % Pacific region or Australia, and 4% in an African continent or region. The remaining 7% were born in either "other" regions of the world or did not respond to this question.

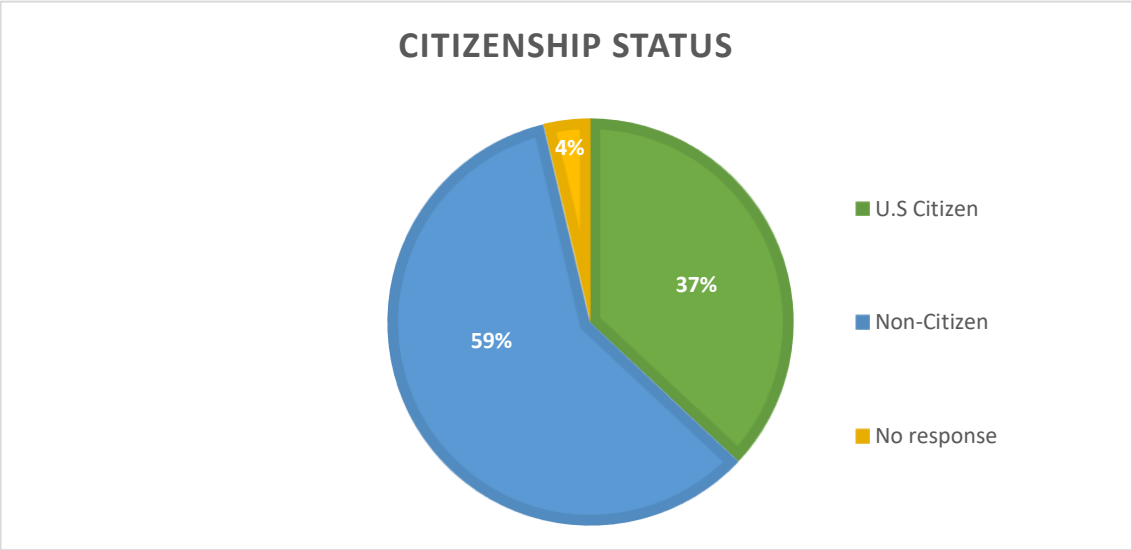

Figure 2: Citizenship status of Foreign-born students

Most survey respondents were students with an immigrant status (43%), followed by 27% foreign-born students who are U.S citizens, 13% were international students and 3% were students who are undocumented or had an unclear immigration status. Their time in the U.S. varied throughout the population with most students having resided in the U.S. for more than 6 years (33%). Twenty-seven percent of the students resided in the U.S. for 4 to 6 years and 16.7% for more than a year but less than 3 years. Of all the participants 37 % were U.S. citizens and about 59% were non-US citizens as shown in Figure 2.

Some questions about the socioeconomic status of the student's and/or their families were asked including employment status and dental insurance coverage. Twenty-three out of thirty participants (79% of total sample) responded to the question that asked about the student's or their family's annual income. As shown in Table 1, there is close to an even split within some income groups. While 27% of the students or their families had an income between $50,000 to $74,999, another 27% made less than $20,000 annually. Seven percent of participants had and annual income between $20,000 to $34,999 and $75,000 to $99,999 each. The remaining 11% of the student's or their families had an income of over $100,000 annually.

Income	**N**	**% of Total Sample**
Less than $20,000	8	27
$20,000 to $34,999	2	7
$50,000 to $74,999	8	27
$75,000 to $99,999	2	7
$100,000 to $124,999	1	4
$125,000 to $149,999	1	4
Over $150,000	1	3
Total	23	79

Table 1: Annual Income of Students' or their families

Most of the students were employed either part-time or full-time while enrolled in higher education. Twenty-three percent worked a part-time, off-campus job whereas, 10% worked a part-time, on campus job. About 17% were employed full-time and 10 % were not currently working. Most students either didn't have dental insurance (37%) or did not know if they had dental

insurance (20%). Only 30% of the participating students in this study sample were covered by dental insurance.

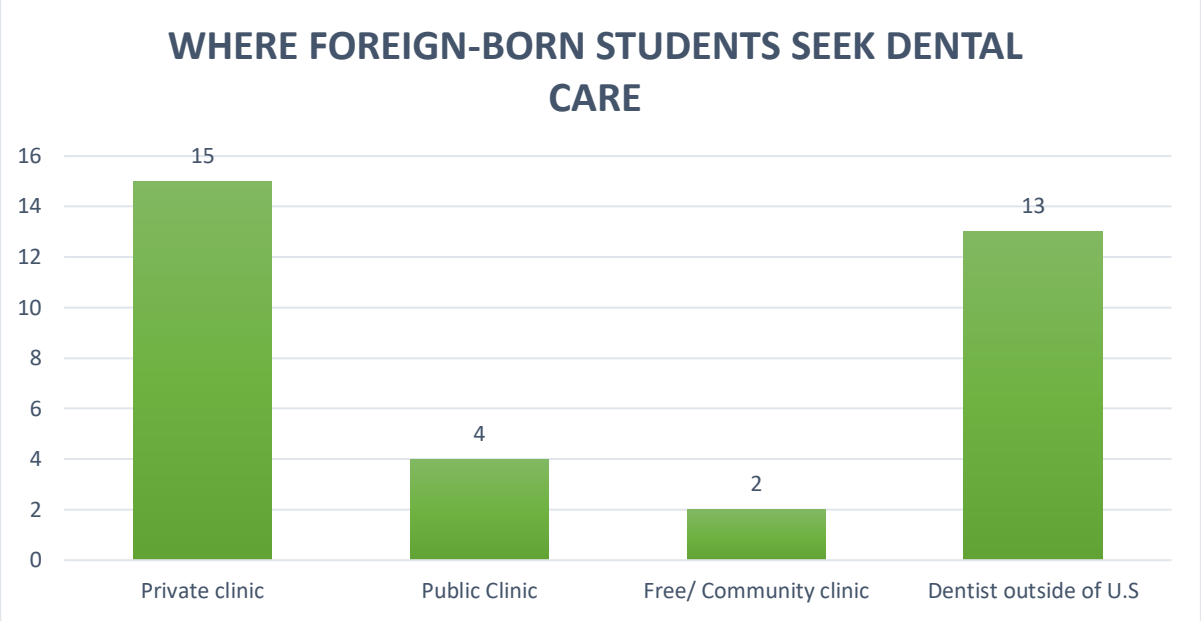

Figure 3: Utilization of Dental Services based on type of Clinic (Select all that apply)

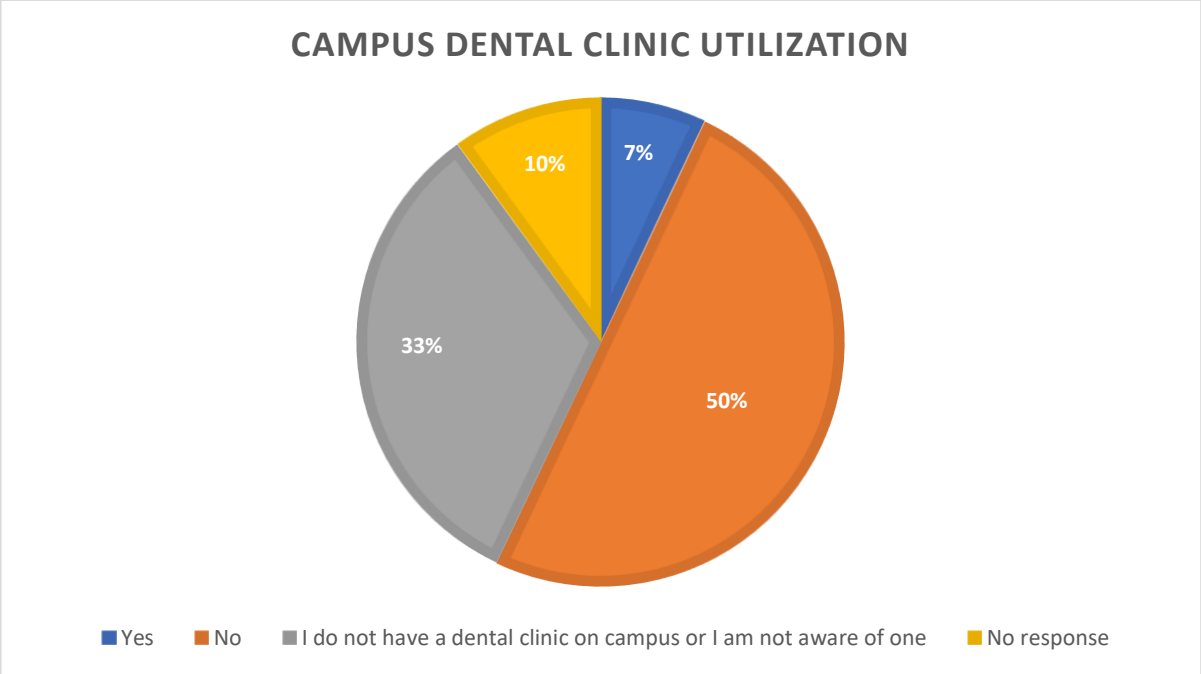

Figure 4: Student's Utilization of On-Campus Dental Clinic

The study participants were also asked where they seek dental care. Figure 3 shows the frequency distribution of student's selection of where they seek dental care. Fifty percent of the responses accounted for private dental clinics, 13% public clinics, 7% free or community health clinics and about 43 % of the responses accounted for not getting dental care in the U.S.

Some universities also have a dental clinic on-campus in student health centers. Upon asking if students have utilized a dental clinic on campus, 50% responded "No", 7% responded "Yes" and about 33% responded they didn't have a dental clinic on campus or are not aware if they had one in their campus as shown in Figure 4.

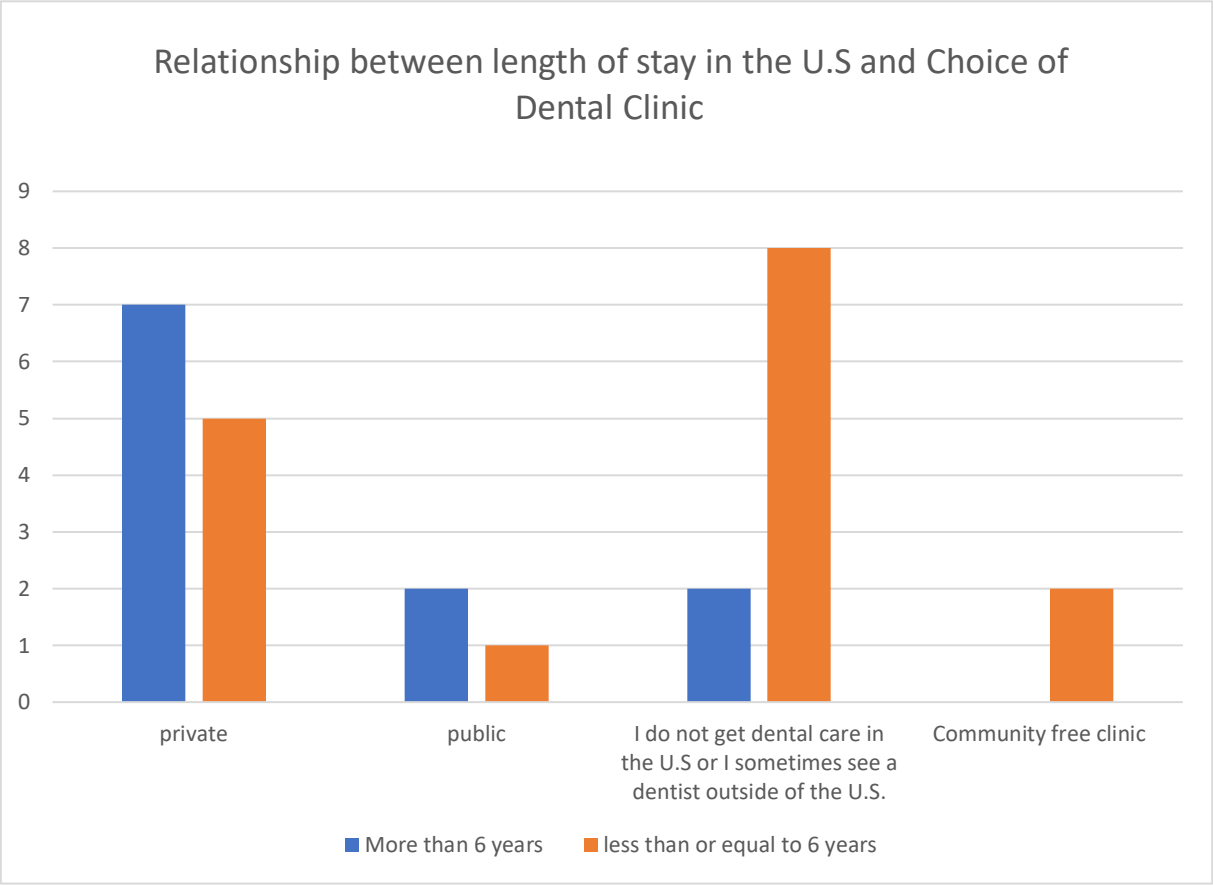

Figure 5: Length of stay in the U.S as a factor influencing Choice of Clinic (Select all that apply)

A relationship between the choice of clinic and length of stay in the U.S. was observed when analyzing the data results. It was found that students who resided in the U.S. for more than 6 years were more likely to utilize a private or public dental clinic in the U.S. compared to those who resided in the U.S for less than six years. Figure 5 represents the frequency of responses for the choice of dental clinic among students who resided in the U.S for more or less than six years. Seven out of 9 students who resided in the U.S for more than six years indicated they seek their dental care in a private clinic. Two out these 7 students also indicated that they sometimes see a dentist outside of the U.S. Two of the 9 students who resided in the U.S for more than six years indicated that they sought care in a public clinic while no one chose to visit a free/ community clinic. Five out of 13 respondents who resided in the U.S. for less than six years go to a private dental clinic of which 3 also indicated that they go a dentist outside of the U.S. One they seek dental care in a public clinic, two in a community free clinic and about a total of 8 responses were accounted for the preference of a clinic outside of the U.S.

Similar to length of stay, citizenship status was also found to be an important factor that have an influence on where student's get care. Figure 6 shows that utilization of a private clinic is more common among citizens as opposed to non-citizens. All 7 U.S. citizens indicated they visited a private dental clinic two students indicating they also sometimes visit a dentist outside of U.S. Two other respondents indicated they visit a public dental clinic, while no body used the free/community clinic. Among 16 non-U.S. citizens, 7 indicated they visit a private clinic, among which 4 also indicated that they see a dentist outside of the U.S. One respondent indicated they visit a public clinic, and two others visited a community free clinic. The majority of non-

citizens 10 out of 16 non-U.S. citizens responded that they do not get dental care in the U.S. or sometimes see a dentist outside of the U.S.

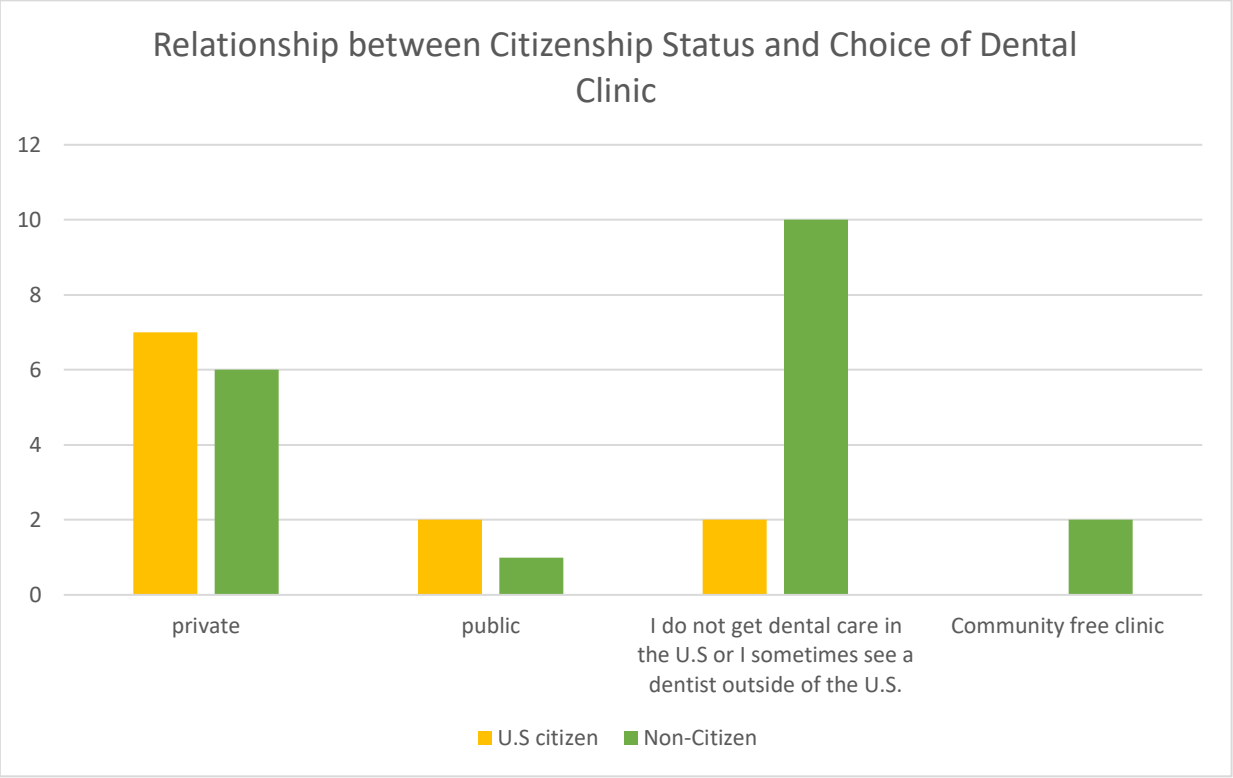

Figure 6: Citizenship status as a factor influencing Choice of Clinic (select all that apply)

Knowledge, Attitudes and Behavior

A number of knowledges, attitude, and behavior questions were asked in the form of true or false and agree or disagree on a five-point Likert scale. Figures 7, 8 and 9 discuss the findings. Seventy percent of the participants correctly identified that some medical conditions like diabetes affect oral health. About 85% were correct that people who smoke are more likely to get oral cancer. Participants were asked if they thought having no pain in the mouth means the mouth is disease free and 93% of the participants chose false as the correct answer. Seventy percent of the

respondents were correct that blood in the toothbrush is a sign of gum disease and about 96% of the respondents knew that sugary foods and drinks cause tooth decay.

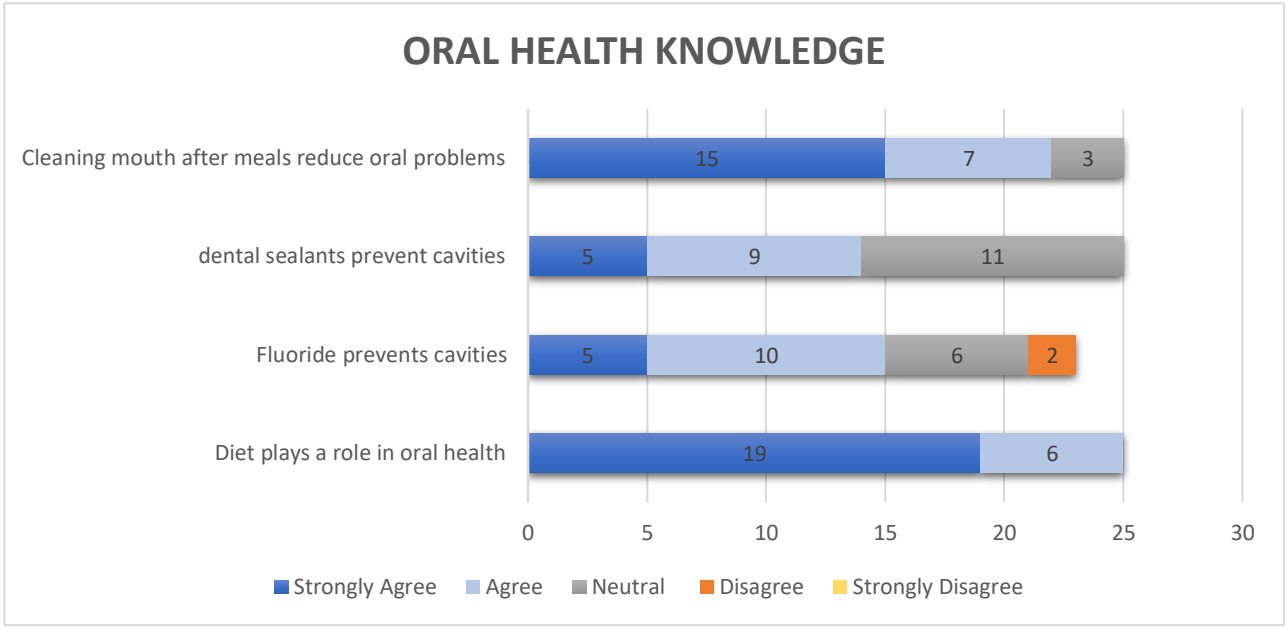

Figure 7: Foreign-born Student's Oral health knowledge on a Five-point Likert scale

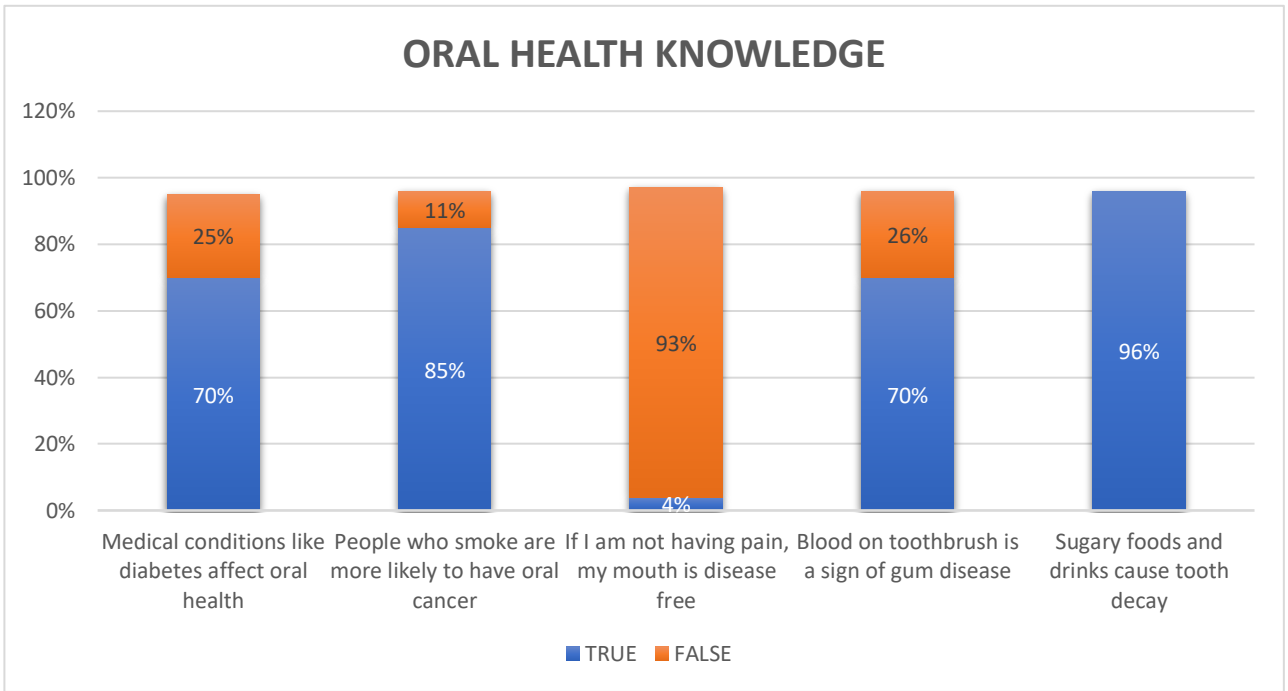

Figure 8: Foreign-born Student's Oral health knowledge on True/False scale

About 83% of the study sample agreed or strongly agreed that diet plays a role in oral health. Thirty-three percent of the students agree and 17% strongly agree that fluoride prevent cavities. While 7% disagreed, 20% of the respondents were neutral about the role of fluoride in preventing cavities. Thirty percent agreed and 17% of the of the student population strongly agreed sealants were an effective preventative measure against cavities, while 36.7% were neutral. Twenty-three percent of the participants agreed cleaning the mouth after meals help reduce oral problems while 50% strongly agreed and 10% were neutral.

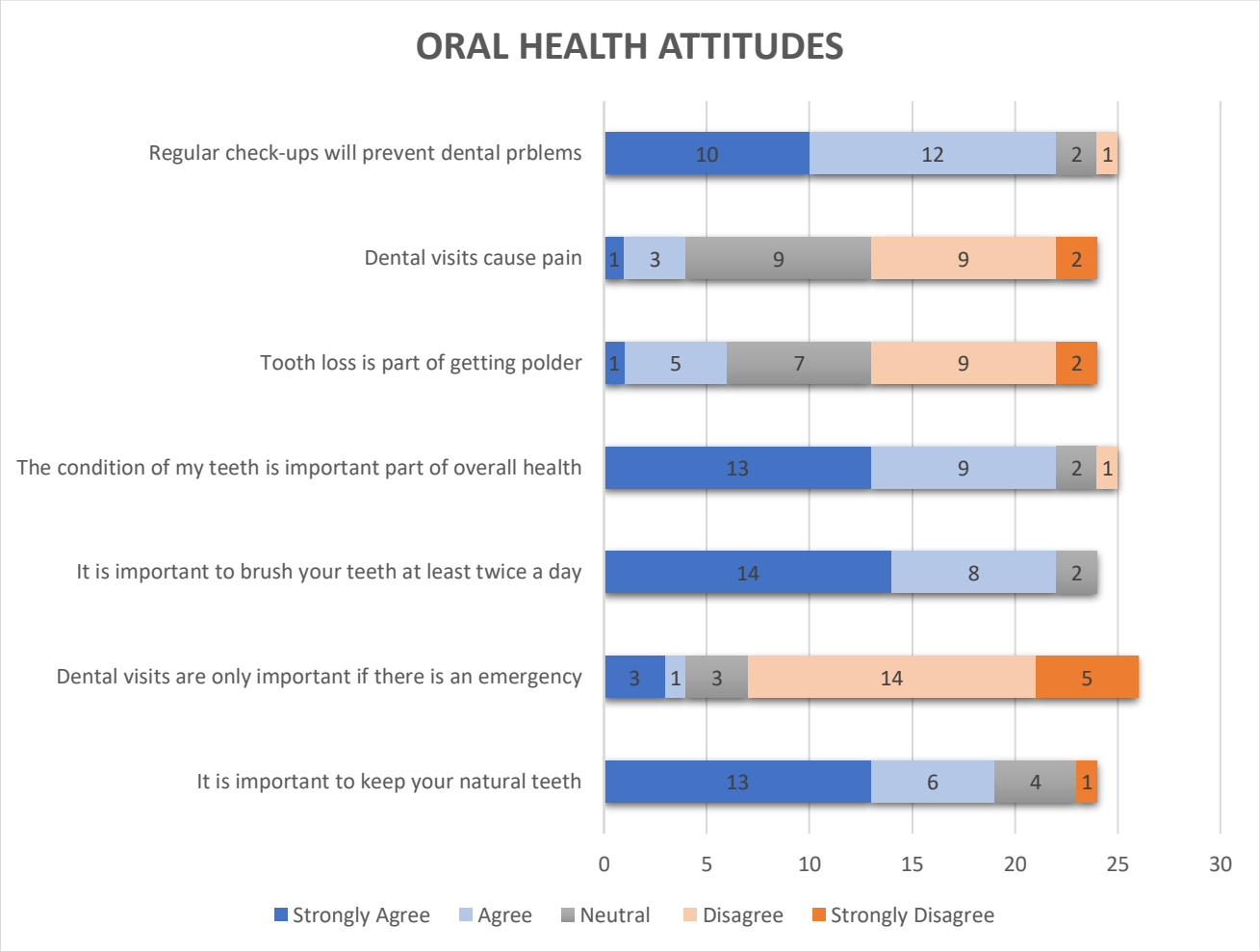

Figure 9: Foreign-born Student's Attitudes toward Oral Health

Forty-three percent strongly agreed and 20% agreed that it is important to keep your natural teeth while 13 % were neutral and 3% disagreed. About 13% of the participant agreed or strongly agreed dental visits are only important if you have a dental emergency and 47% disagreed and 17% strongly disagreed. Ten percent were neutral to the idea. Forty-seven percent strongly agreed and 27% agreed that it is important to brush their teeth at least twice a day while 7% were neutral. About 73% of the respondents agree or strongly agree that the condition of their teeth is an important part of their oral health, while 7% were neutral and 3% disagreed. Seventeen percent agreed tooth loss is part of getting older and 3% strongly agreed. Thirty percent disagreed, 7% disagreed, and 23% were neutral about tooth loss being part of getting older. While 13%agreed and strongly agreed, 37% disagreed or strongly disagreed that dental visits cause pain. Thirty percent were neutral. Forty percent agreed and 33% strongly agreed regular check-ups will prevent oral problems, while 7% were neutral and 3% disagreed.

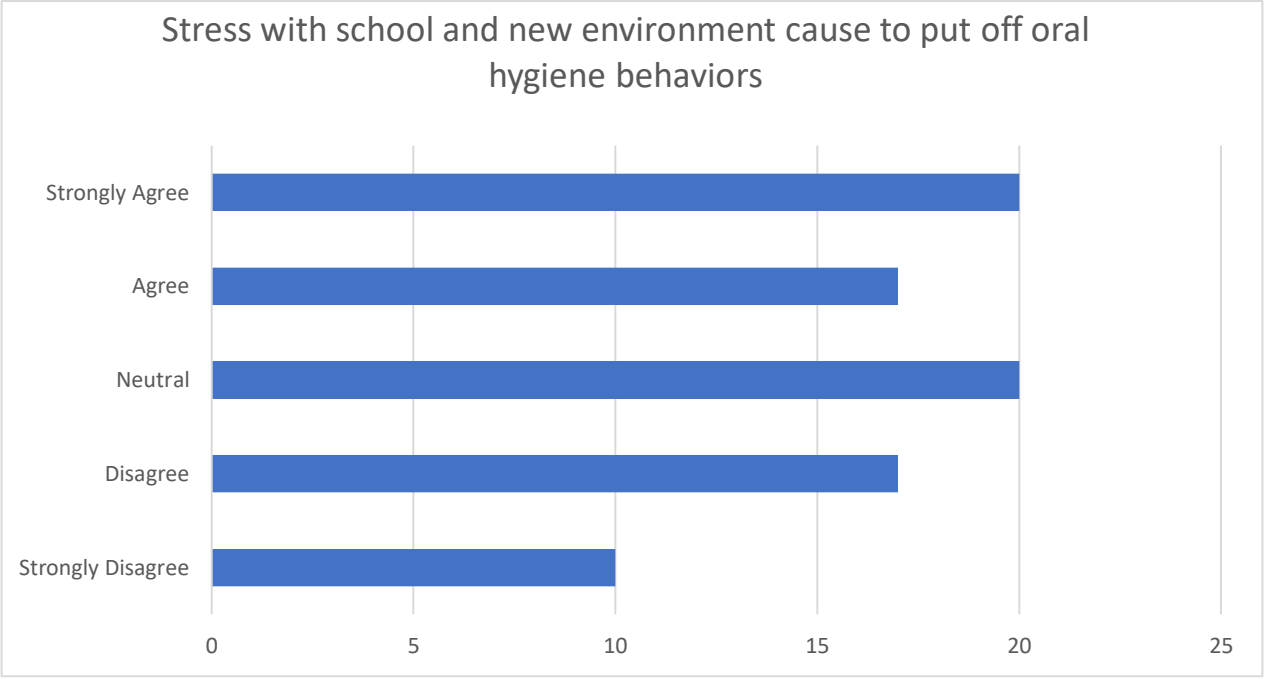

Figure 10: Effect of stress on oral health habits

The study participants were asked to rate how stress with school or new environment have caused them to put off their oral hygiene behaviors and about 37% agreed or strongly agreed that stress with school or new environment did affect their behaviors while 27% disagreed or strongly disagreed and 20% were neutral. Forty-three percent agree they have enough educational resources to maintain good oral health while 37% were neutral.

The survey participants were also asked to explain how their oral health habits changed since they started college or arrived in the U.S. Forty percent said their behavior since college did not change, 23% said it increased a little, 10% said it increased a lot. About 3% responded their habits decreased a lot since college while the other 13% said it decreased a little. Upon arrival in the U.S., 23% students responded their oral hygiene behaviors increased a little while it increased a lot in 20% of the sample. Seven percent said it decreased a little and the other 7% said it decreased a lot while 33% responded that their behavior remained unchanged.

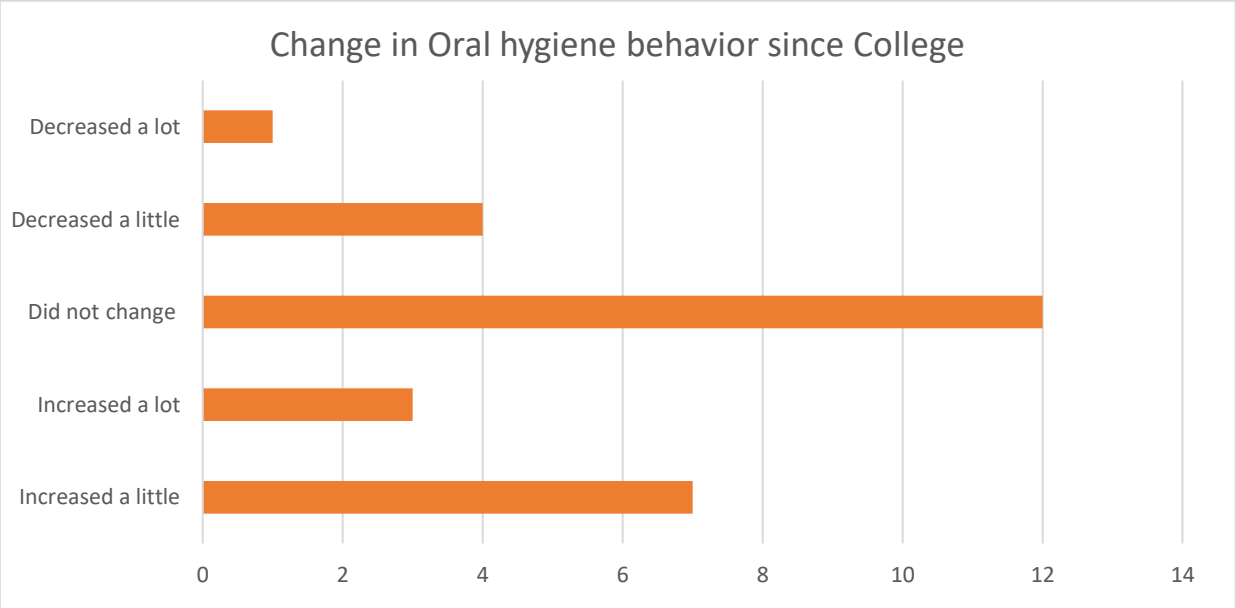

Figure 11: Change in oral health habits since College

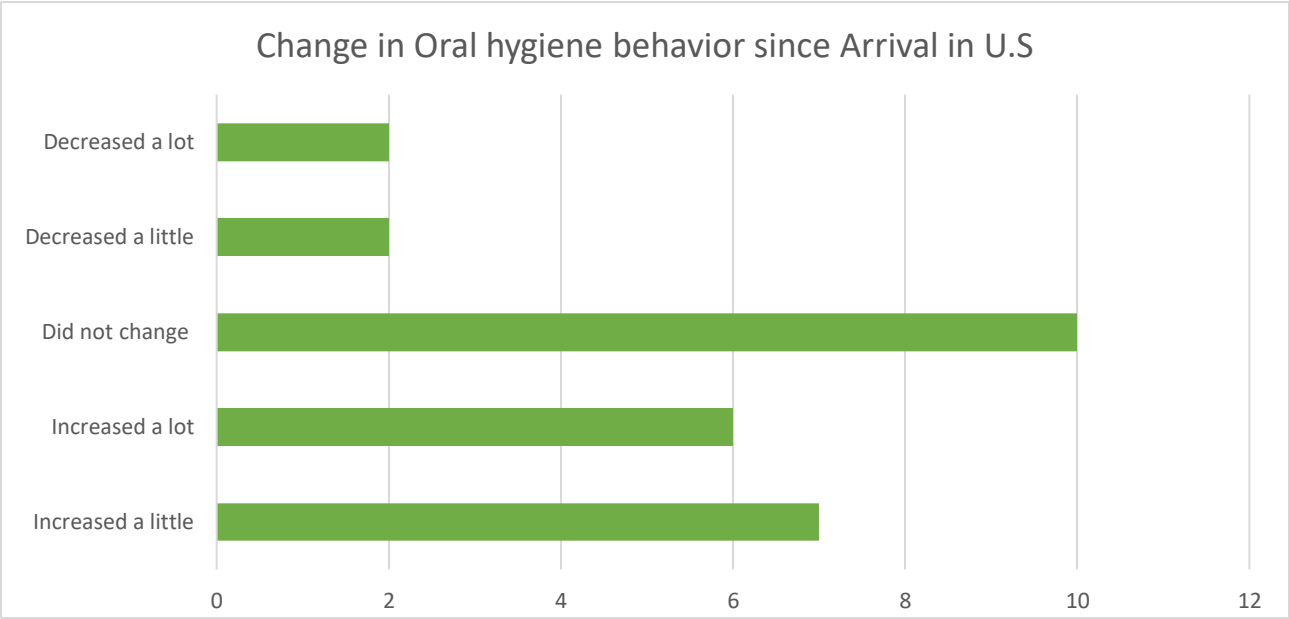

Figure 12: Change in oral health habits since migration to the U.S.

General Oral Health Practices, Oral Condition and Satisfaction with care

Forty-three percent of the sample brushed twice or more a day and 37% brushed once a day. Three precent brushed once a week and the other 3% never brushed. Thirty percent of the population performed an interdental cleaning such as flossing once a day, 7% performed it twice or more a day while 10% of the population never clean in between their teeth. Seventeen percent floss once a week, 13% two to six times a week and 10% less than once a week. The study participants were asked to rate the condition of their mouth as good, fair, very good or excellent. About 17% responded that their mouth condition was “fair” and 40% said it was “good.” Only 26.7 responded it was “very good” while 7% said it was “excellent.” Upon asking how satisfied students were with their last dental visit in the U.S., 17% responded they were extremely satisfied, 23% were somewhat satisfied and 7% were neither satisfied nor dissatisfied.

Access and Utilization of Dental Services and Potential Barriers to Care

A series of question were asked to investigate accessibility and utilization of dental services and any barriers to care. The study participants were asked how long ago they have visited a dentist and 47% responded they visited a dentist in less than 12 months ago. Twenty-four percent saw their dentist between 1-2 years ago, 7% more than 5 years ago, 10% do not remember and about 3.3% have never visited a dentist.

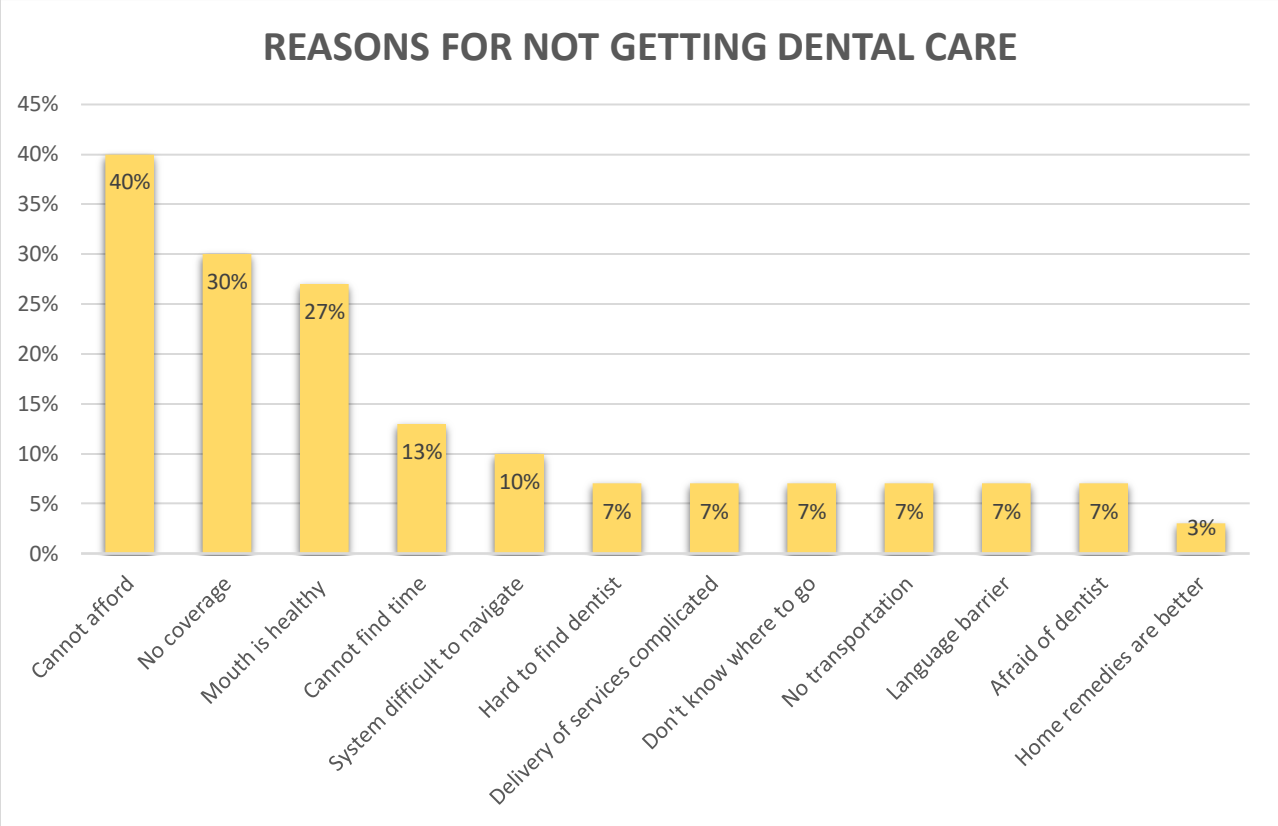

Figure 13: Potential barriers to access and utilization of dental services

While 47% did not feel like they couldn't get the dental care they needed, 43% agreed that they couldn't receive the needed dental care. The most frequent problems that these individuals were unable to get care for was for relief of pain (17%), and teeth filled, extraction or other major

work (17%). Ten percent of the population were unable to get a cleaning done in the past twelve months.

Some questions were asked to get an insight on the reasons why the participants did not get the care that they needed and the barriers to access dental care. Twenty-seven percent believed their mouth was healthy, so they didn't need to visit a dentist. About 7% did not know where to go to get the dental care they need. Forty percent of the participants said they could not afford it and 30% said because they have no dental coverage. Seven percent said it is hard to find a dentist that accepts their insurance plan and another 7% thought the healthcare delivery of services is too complicated to understand. Ten percent of the population thinks the U.S. healthcare system is too difficult to navigate. About 13% of the students could not find the time to go to a dental clinic and 7% were afraid to see a dentist. Seven percent had no transportation and other seven percent had a language barrier. Only 3% believed that it was better to treat dental problems at home.

DISCUSSION

This study explored perceptions of oral health access among non-U. S born postsecondary students. The primary objective of this study was to gain a better understanding of the barriers and facilitators that influence oral health behaviors within this aforementioned population. Hypothesis 1 predicted that foreign-born college students do not utilize dental services in the U.S due to the perception that it is unaffordable. Based on the data collected, most students (43%) who failed to receive dental care within the last 12 months could not do so due to affordability (40%) or lack of dental insurance (30%). Accessibility to oral health services greatly depend on age and the cost of services. The third-leading response to the question "Reasons for not getting the dental care" suggests that some foreign-born postsecondary students, approximately 27% of our respondents, do not feel the need to receive dental care unless they perceive their mouth to be "unhealthy". This is a potentially dangerous perception, as "regular dental visits" to the dentist is recommended for all individuals, whether or not they perceive their mouth as "healthy". (Mc Grath, et al., 2001). The fourth leading reason for not visiting a dentist was "not having the time" (17%). The results of this study were, however, consistent with the results of a research study conducted by Yarbrough, Nasseh, and Vujicic (2014) where the top reason for not visiting a dentist between 18-34 years old were having a healthy mouth (37.9%), cost (35.7%) and not having time to get to a dentist (28.4%) (Yarbrough et al., 2014)

Despite the abundance of dental clinics in the U.S, a portion (43%) of our respondents seek dental care from a dentist outside of the U.S. This potential behavior among foreign-born postsecondary students can be harmful to the health of their oral cavity as they are likely to lack access to their preferred dental clinics while studying in the U.S. There are multiple oral diseases, such as cavities and gingivitis, that lead to poorer health outcomes the longer they are untreated.

This population's potential hesitancy or lack of desire to utilize U.S. dental clinics is valuable information for university health officials as well as community health partners.

A correlation was identified between the length of stay and choice of dental clinic among survey respondents. Respondents who have resided in the U.S for more than 6 years were more likely to visit a dentist in a public or a private clinic in the U.S. than respondents who have resided in the U.S. for less than 6 years. Similarly, respondents with citizen status were more likely to visit a dentist in a public or private clinic in the U.S than non-citizen status respondents. Previous research supports these survey findings, demonstrating that foreign-born individuals living in the U.S. often acculturate and become increasingly willing to visit a dentist in the U.S the longer they have resided within the U.S. Ying Liu conducted a study in 2016 that compared self-perceptions of oral health between U.S citizens and non-citizens and found that a non-citizen status had a negative effect on one's oral health status and oral health seeking behaviors.

As shown in Figure 4, 33% of respondents do not have a dental clinic on campus or are not aware of one. These findings suggest that some foreign-born students are not aware of the presence of their campus' dental clinic or simply attend an institution that do not have a campus dental clinic. Moreover, this data may indicate that foreign-born students lack access to dental clinics, specifically, foreign-born students who may live on campus without adequate transportation. Existing literature has shown that this population experiences difficulties in accessing oral health services due to lack of time, transportation, and dental coverage or expenses. Having a dental clinic on campus remove the barriers to commuting and saves time by making services more easily available to students. Of the respondents who were aware of their university's dental clinic, 50% of respondents answered that they had utilized the clinic's services.

As displayed in Figure 7 and 8, an overwhelming majority of respondents demonstrated strong oral health literacy on topics such as diet playing a role in oral health, sugars causing tooth decay, smoking causing oral cancer, etc. Their knowledge of fluoride and sealants as preventative oral health measures, however, yielded poorer responses. This relative lack of literacy with regards to fluoride and sealants could be due to their lack of presence in local and national oral health campaigns, which often place a greater emphasis on the aforementioned areas of oral health literacy in which a larger majority of respondents answered correctly. Furthermore, there is evidence of less fluoride treatment and utilization of sealants in countries outside of the United States, contributing to this potential gap in oral health literacy among non-US born postsecondary students (Petersen, 2005).

The results of this study demonstrate that while oral hygiene behaviors do increase upon arrival to the U.S, a similar trend follows in postsecondary students. While 33% of respondents indicated that their oral hygiene behavior remained the same or improved upon arrival to the U.S. (43%), 14% indicated it worsened. Similarly, 33% of respondents indicated that their oral hygiene behavior increased or remained the same (40%) upon arriving as a postsecondary student, 16% indicated their oral hygiene worsened as a postsecondary student. These findings suggest that one's oral hygiene behavior can improve as they settle into the U.S. Similarly, there may be a positive effect in one's oral health upon arriving to postsecondary school as well. As shown in Figure 10, study participants agreed that stress with school and/or new environment worsened their oral hygiene behavior. This finding is consistent with a research study where academic stress was found to have a negative impact on student's oral health (Seol-Hee, 2016)

IMPLICATIONS/ FUTURE DIRECTIONS

This pilot study sought to explore perceptions of oral health access among non-US born postsecondary students to explore the factors that drive this population's oral health behaviors. While the findings of this study provided invaluable insight on the factors that influence oral health in foreign-born postsecondary students, there were clear limitations. For one, there were merely thirty students who participated in this research study with the majority of respondents (63%) identifying as Asian. Further research conducted on this specific population would benefit from a greater sample size and a sample population that is more representative of foreign-born postsecondary students enrolled. Limitations were also present in the survey administered to subjects. For example, one survey question included the option "I do not have a dental clinic on-campus or I am not aware of one". By grouping these two distinct responses into one, researchers were unable to determine the approximate number of respondents who did not have a dental clinic on campus. Similarly, researchers would have no means to determine the number of respondents who were simply unaware of whether or not their postsecondary campus had a dental clinic.

The findings of this study were frequently supported by the existing body of literature. Barriers to oral health that were identified in this study, such as affordability, lack of insurance, stress, and increased workload, were all determined by previous literature to be associated with a decrease in dental visits among young adults. To minimize some of these aforementioned barriers, university health officials can consider developing an on-campus dental clinic that will allow for easier access to oral health services, while also reducing costs related to transportation. University officials may also consider educating foreign-born postsecondary students on community dental clinics within the region. Community clinics are not only a valid means of receiving oral health care but are often more affordable. This study also found that many foreign-born students deemed

it unnecessary to visit a dentist because they perceived their mouth as “healthy”. These findings suggest that our sample population does not believe dental care is necessary unless they identify their mouth as “unhealthy”, a potentially dangerous gap in their oral health literacy. University health officials and/or community partners may benefit from educating this population of students with evidence-based oral health information, such as the ADA’s recommendation that a licensed dentist should determine the frequency at which a given individual attends a dental clinic each yeah, despite whether or not one perceives their mouth as “healthy”. Furthermore, the study identified that many subjects did not see any benefit in the use of sealants. This may have been due to the population’s general lack of awareness of sealants, a lesser-known form of preventative dental care that can prevent cavities and the less affordable treatment options to arise once a patient arrives to a dental clinic with cavities.

Study results have also found that a large portion of foreign-born student do not utilize dental clinics even when they have one on-campus. This could be the result of a lack of outreach and promotion to the student body. One method to increase awareness of university dental clinics among enrolled students could be through organized campaigning during World Oral Health Day. This increase in awareness may then lead to increased utilization among the student body. Efforts could also be made by institutions to incorporate oral health-based education, whether virtually or in-person at university orientations. These initiatives can not only improve oral health literacy among this student population, but positively impact their health and potentially improve their academic performance. The results of this study suggest that this population lacks adequate knowledge on fluoride and dental sealants. Educating students on these cost-effective resources could potentially lead to an increased utilization of these preventative interventions. Facilitating free and/or discounted oral health care could also be facilitated to improve the oral health care of

a given student body. Further research must be conducted to investigate why students often fail to utilize on-campus dental clinics.

If a postsecondary campus does not have an operating dental clinic, university officials should explore developing relationships with dentists and dental hygienists within the area for referrals and other university-related partnerships. Partnering with local dentists to donate oral hygiene products such as toothbrushes and toothpaste for college students can also extend resources to students who are low income or experiencing food insecurity. There is also a need for foreign-born students, who do not have a citizen status, to be connected to Community and Migrant Health Centers or dentists in the area as they may face unique barriers such as cultural incompetency, language and transportation. Connecting this population with these aforementioned resources could lead to some visiting a dentist in the U.S. before a potential oral disease progress. In many cases, as mentioned in the discussion, foreign-born postsecondary students in the U.S. will only see a licensed dentist when they are overseas.

The findings of this research suggest that length of time and citizenship status have a positive relationship to oral health. This supports the body of literature showing that acculturation does allow for improved health outcomes in foreign-born individuals residing in the U.S. An explanation for these findings may be that there is a greater emphasis among U.S. citizens and U.S. culture on oral health and the aesthetic value of one's mouth, both of which overlap one another. However, further research must be conducted to fully understand the behavior changes among foreign-born students as a result of migration.

APPENDIX A: SURVEY QUESTIONS

Perceptions of Oral Health Survey

Start of Block: Explanation of Research block

Q1 **EXPLANATION OF RESEARCH** Title of Project: Perceptions of Oral Health Access among Foreign-born College Students

Principal Investigator: *Tracy Wharton, PhD, LCSW*
Other Investigators: *Rahema Khan, Olga Molina, DSW, LCSW*

You are being invited to take part in a research study.
The aims of this study are to better understand the perceptions of oral health access among non-US born college students and to identify factors affecting oral health behaviors. Only college students born outside of the U.S. and 18 years of age or older will be recruited for this study. If you are interested in participating, please continue to be directed to a data-secured Qualtrics survey. The survey consists of 30 questions and should take no longer than 10 minutes. Your responses are completely anonymous and voluntary. No personally identifiable information will be collected at any point during the course of the study. Responses recorded in this survey will only be accessible to the research investigators at the University of Central Florida for data analysis.

By continuing to take the survey, you consent to take part in this research study.

We thank you for your participation!

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints, please contact*: Dr. Tracy Wharton, Associate Professor, College of Health Professions and Sciences at (407) 823-2819 or by email at Tracy.Wharton@ucf.edu*

IRB contact about your rights in this study or to report a complaint: If you have questions about your rights as a research participant, or have concerns about the conduct of this study, please contact Institutional Review Board (IRB), University of Central Florida, Office of Research, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901, or email irb@ucf.edu.

Q2 What is your age?

_____

Q3 What is your gender?

- ○ Male
- ○ Female
- ○ Other/nonbinary

Q4 What is your ethnicity?

- ○ White or European descent
- ○ Black or African American
- ○ Hispanic or Latinx
- ○ Asian or Pacific Islander
- ○ Native American or Alaskan Native
- ○ Mixed race
- ○ Other _____

Q5 Were you born in the U.S.?

- ○ Yes
- ○ No

Skip To: Q30 If Were you born in the U.S.? = Yes

Q6 What region of the world were you born in?

- ○ North America or Arctic region
- ○ Central or South America or Antarctic region
- ○ Pacific region, Australia or NZ
- ○ European region (including Scandinavian countries)
- ○ Mediterranean region
- ○ African continent and region
- ○ Asian region or Far East
- ○ Middle Eastern region or Persia
- ○ Russia
- ○ Other _____

Q7 Are you a U.S. citizen?

- ○ Yes
- ○ No

Q8 How long have you been in the U.S.?

- ○ Less than 6 months
- ○ 6-12 months
- ○ More than 1 year but less than 3 years
- ○ 4-6 years
- ○ More than 6 years

Q9 Please select the option that best applies to you:

- ○ Immigrant/ Permanent resident
- ○ International student
- ○ Foreign-exchange student
- ○ Study-abroad student
- ○ DACA recipient
- ○ Undocumented or unclear immigration status

Q10 Please select all that apply to you as a student:

- [ ] Part-time
- [ ] Full-time
- [ ] Undergraduate
- [ ] Freshman
- [ ] Sophomore
- [ ] Junior
- [ ] Senior
- [ ] Graduate
- [ ] Masters
- [ ] Doctorate
- [ ] Post-doctorate
- [ ] Other _____

Q11 What is your employment status?

- [ ] Full-time
- [ ] Part-time off-campus employment
- [ ] Self-employed
- [ ] Not working currently
- [ ] Part-time employed on campus or work-study

Q12 If you pay your own expenses, what is your annual household income? If you rely on family to support you, please indicate your family's annual income.

- ○ Less than $20,000
- ○ $20,000 to $34,999
- ○ $35,000 to $49,999
- ○ $50,000 to $74,999
- ○ $75,000 to $99,999
- ○ $100,000 to $124,999
- ○ $125,000 to $149,999
- ○ Over $150,000

Q13 Are you currently covered by any type of dental insurance plan (through an employer, another family member, direct purchase, Medicare, Medicaid or other government assistance plan, TRICARE, VA, etc.?)

- ○ Yes
- ○ No
- ○ Don’t Know

Q14 How long has it been since you last visited a dentist or a dental clinic for any reason?

- ○ Less than 12 months ago
- ○ Between 1-2 years ago
- ○ Between 2-5 years ago
- ○ More than 5 years ago
- ○ Never
- ○ Do not Remember

Q15 Where do you usually receive your dental care? (Check all that apply)

- ☐ Private dental office
- ☐ Public dental clinic
- ☐ Hospital emergency room
- ☐ Community free clinics or sliding scale provider
- ☐ On-campus dental Clinic
- ☐ I do not get dental care in the U.S or I sometimes see a dentist outside of the U.S.

Skip To: Q17 If Where do you usually receive your dental care? (Check all that apply) = I do not get dental care in the U.S or I sometimes see a dentist outside of the U.S.

Q16 How satisfied were you with your last dental visit in the U.S?

- ○ Extremely satisfied
- ○ Somewhat satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Somewhat dissatisfied
- ○ Extremely dissatisfied

Q17 If you have a dental clinic on campus, have you utilized it?

- ○ Yes
- ○ No
- ○ I do not have a dental clinic on campus, or I am not aware of one.

Q18 In the last 12 months, was there a time when you needed dental care but could not get it?

- ○ Yes
- ○ No

Skip To: Q19 If In the last 12 months, was there a time when you needed dental care but could not get it? = Yes

Skip To: Q20 If In the last 12 months, was there a time when you needed dental care but could not get it? = No

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Q19 You indicated that at least once in the last 12 months, you needed dental care, but you were unable to get it. What type of dental care did you think you needed?

- ○ Teeth filled or replaced, extraction or other major work
- ○ Relief of pain
- ○ Work to improve appearance (braces or bonding)
- ○ Cleaning
- ○ Other _____

Q20 Please select the items below which may be reasons why you have not gotten the dental care that you may have needed in the past.

- [ ] My mouth is healthy, so I did not really need to visit a dentist.
- [ ] I do not know where to go to receive dental services.
- [ ] I cannot afford to go to the dentist.
- [ ] I do not have dental coverage.
- [ ] It is too hard to find a dentist that accepts my dental plan.
- [ ] Delivery of services is too complicated to understand.
- [ ] U.S healthcare system and insurance plans are difficult to navigate.
- [ ] I cannot find a convenient time to visit the dentist.
- [ ] I do not have transportation.
- [ ] I'm afraid of going to the dentist.
- [ ] Language barrier
- [ ] Dental provider is not culturally competent.
- [ ] Home remedies are better in preventing oral diseases.
- [ ] My religious practices prevent me from getting dental care.
- [ ] Other _____

Q21 How would you describe the condition of your mouth and teeth?

- ○ Poor
- ○ Fair
- ○ Good
- ○ Very Good
- ○ Excellent
- ○ Prefer not to answer, or do not know.

Q22 How often do you brush your teeth?

- ○ Never
- ○ Less than once a week
- ○ Once a week
- ○ 2-6 times a week
- ○ Once a day
- ○ Twice or more a day
- ○ Not applicable (no natural teeth)

Q23 How often do you clean your teeth (using dental floss, dental tape, toothpick, etc.)

- ○ Never
- ○ Less than once a week
- ○ Once a week
- ○ 2-6 times a week
- ○ Once a day
- ○ Twice or more a day
- ○ Not applicable (no natural teeth)

Q24 Are the following statements true or false? If you don't know please make your best guess.

	True	False
Some medical conditions like diabetes affect the health of your mouth.	○	○
People who smoke are more likely to have cancer in their mouth.	○	○
If I am not having any pain in my mouth, then my mouth is disease free.	○	○
Blood on your toothbrush is a sign of gum disease.	○	○
Sugary foods and drinks cause tooth decay.	○	○

Q25 How strongly do you agree or disagree with the following statements?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Diet plays a role in oral health.	○	○	○	○	○
Fluoride prevents dental cavities.	○	○	○	○	○
Dental sealants help prevent dental cavities.	○	○	○	○	○
Cleaning the mouth after meals helps to reduce oral health problems.	○	○	○	○	○
It is important to keep your natural teeth.	○	○	○	○	○
Dental visits are only important if you have a dental emergency.	○	○	○	○	○
It is important to brush your teeth at least twice a day.	○	○	○	○	○
The condition of my teeth is an important part of my overall health.	○	○	○	○	○
Tooth loss is part of getting older.	○	○	○	○	○
Dental visits cause pain.	○	○	○	○	○

Regular check-ups will prevent dental problems.	○	○	○	○	○

Q26 Please rate the following:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Stress with school or new environment has caused me to put off my oral hygiene behaviors.	○	○	○	○	○
I have enough educational resources available to me regarding how to maintain good oral health.	○	○	○	○	○

Q27 Please rate the following:

	Increased a lot	Increased a little	Decreased a lot	Decreased a little	Did not change
My oral hygiene behaviors, such as regular brushing/ flossing or dental visits, have changed since I got into college.	○	○	○	○	○
My oral hygiene behaviors, such as regular brushing/ flossing or dental visits, have changed since my arrival in the US.	○	○	○	○	○

Q28 How often during the past 12 months have you felt that life in general was less satisfying because of problems with your mouth and teeth?

- ○ Never
- ○ Rarely
- ○ Occasionally
- ○ Often
- ○ Always

Q29 If you'd like to share ways that your dental experience could be improved in the U.S, please share them here:

_____

_____

_____

_____

_____

Q30 Thank you for your time in taking this survey! Your responses will help us to understand your experiences of dental care in the US.

End of Block: Default Question Block

APPENDIX B: IRB NOTICE OF EXEMPTION

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

EXEMPTION DETERMINATION

September 22, 2020

Dear Tracy Wharton:

On 9/22/2020, the IRB determined the following submission to be human subjects research that is exempt from regulation:

Type of Review:	Initial Study, Category 2
Title:	Perceptions of Oral Health Access among Foreign-born College Students
Investigator:	Tracy Wharton
IRB ID:	STUDY00002209
Funding:	None
Grant ID:	None
Documents Reviewed:	• HRP-254-FORM-(Oral Health Access Study) (Edited).doc, Category: Consent Form; • HRP-255-FORM-(Oral Health Access Study)Edited.docx, Category: IRB Protocol; • Oral health survey recruitment text.docx, Category: Recruitment Materials; • survey Perceptions_of_Oral_Health (2).docx, Category: Survey / Questionnaire;

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please submit a modification request to the IRB. Guidance on submitting Modifications and Administrative Check-in are detailed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Racine Jacques, Ph.D.
Designated Reviewer

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